

Maine's Marine Fisheries

Rationale

The entire history of the State of Maine stems from the discovery of the rich fisheries along its rockbound coast. This course is designed for all teachers wishing to build their knowledge about our natural resources and maritime history; integrate fisheries into their Maine Studies curriculum; and incorporate new activities into their science, math, history, geography, and literature lessons. There is limited information available to teachers about Maine's earliest industry – fishing.

This course will cover the history and management of three fishery types: recreational, commercial, and fish farming. During the past 400 years, there have been significant changes in the methods and productivity of the fishing industries. Presently, the wild stocks have been overexploited and we have been witnessing the collapse of most fisheries, one species after another. Throughout this course, emphasis will also be placed on the socioeconomic, biological, and ecological factors associated with Maine's marine resources.

Primary Instructors

Elaine Jones, Education Director, Department of Marine Resources, W. Boothbay Harbor, ME
Betty Schopmeyer, Education Coordinator, Penobscot Marine Museum, Searsport, ME

Secondary Instructors

Bruce Joule – Recreational Fishing Scientist, Department of Marine Resources
Carl Wilson – Lobster Scientist, Department of Marine Resources
Amy Fitzpatrick – Director of Public Health (PSP & Water Quality), DMR
Sally Sherman – Groundfish Scientist, Department of Marine Resources
Robert Russell – Sea Urchin Scientist, Department of Marine Resources
Les White – Shrimp Scientist, Department of Marine Resources
Deb Wilson - Archeologist

Field Trips

Visit Grand Banks Schooner *Sherman Zwicker* at the Maine Maritime Museum
Participate in trawl survey aboard the Darling Center's research vessel in Walpole
Visit the oyster midden on the Damariscotta River – interpretation by archeologist Deb Wilson
Dig alongside local clam harvesters
Visit the Maine State Aquarium and the DMR research laboratory

Class Schedule

July 21 – 25, 2008

This is a week-long residential course based at the Burnt Island Light Station in Boothbay Harbor, Maine. Instruction will begin at 8:30 AM with activities continuing into the evening hours. Students are expected to complete reading assignments; participate in all classroom and field activities; engage in discussions; and complete a final project with inquiry-based lesson plans.

Required Textbook (Provided)

Cod: A Biography Of The Fish That Changed The World, by Mark Kurlansky, 1997
A Doryman's Day, by Captain R. Barry Fisher, 2001

Required Readings (Provided)

The Lobster At Home, Scribner's Monthly Magazine, 1881

Inshore Groundfish Trawl Survey Procedures and Protocols, by Sherman, Stepanek and Sowles

The Prehistoric Oyster Shell Heaps of the Damariscotta River, by Harold Castner, 1969

Guide To Lobstering In Maine, by DMR staff

Evaluation Criteria

Pre & Post tests	20%
Assignments	20%
Participation	30%
Final Project	30%

Pre & Post Tests will be administered using the Classroom Performance System.

Course Assignments will include readings prior to the course, readings during the evening hours, reflection questions, and written assignments.

Class participation will be evaluated based on the quality and consistency of contribution to the discussion forum.

Final Project will be the development of a unit comprised of inquiry-based lessons on a topic relevant to the course. The lessons will be made available to teachers, and the public, on the Department of Marine Resources website.

Course Topics and Objectives**Day 1****Gulf of Maine**

Visitors to the Maine coast look seaward to a unique body of water called the Gulf of Maine. This 36,000 square mile area differs from that of the Atlantic Ocean in its geologic history, water temperature, color, salinity, physical processes, and marine life. Teachers will become familiar with this "sea beside a sea," and its watersheds, by viewing a power point presentation, labeling the geographic boundaries, and creating a watershed model.

Objectives

- a. Locate the physical boundaries of the Gulf of Maine.
- b. Identify the rivers that flow into the Gulf of Maine.
- c. Understand reasons for productivity in the Gulf of Maine.
- d. Locate which areas serve as popular inshore and offshore fishing grounds.
- e. Demonstrate the concept of watersheds and how they connect to the Gulf of Maine.
- f. Understand that water flowing through a watershed carries nutrients and pollutants.
- g. Learn about the work of Gulf of Maine Ocean Observing System - GoMOOS

History of Maine's Fisheries

Native Americans, explorers, early settlers, and Mainers up to the present have depended upon the region's marine resources for food and trade. The Penobscot Marine Museum's guidebook for teachers called MATES and the museum's education website (www.Penobscotbayhistory.org) will be used as an instructional tool for discussing the development of Maine's fisheries and their impact upon our history.

Objectives

- a. Learn how fishing played a crucial role in the lives of Native Americans.
- b. Read the accounts of early explorers describing their discoveries of fish.
- c. Identify the settings for European fishing stations along our coast.
- d. Describe the living conditions aboard a fishing schooner using historic photographs and accounts from the book *A Doryman's Day*.
- e. Discuss the book "Cod: A biography of the fish that changed the world."
- f. Understanding the technological, scientific, and human dimensions that affected our fisheries over time.

Field Trip

Participants will depart from Burnt Island in the late afternoon and travel upriver to the Maine Maritime Museum in Bath. Here, they will visit the *Sherman Zwicker* – a dory schooner that once fished the Grand Banks. This vessel has been restored so that visitors can truly understand what life was like aboard a fishing schooner. On the hour trip to and from the museum, teachers will receive information about the natural and maritime history of the region.

Day 2

Recreational Fishing

One of the oldest and most popular activities is catching fish. Today, more than 50 million people fish for recreational enjoyment. The catch is often shared and eaten with other people because anglers do not sell their catch. However, some recreational fishermen prefer to practice catch and release, returning their catch unharmed as soon as it is caught. Participants will meet with the DMR biologist in charge of recreational fisheries prior to their own fishing experience off Burnt Island.

Objectives

- a. Learn about fish and their preferred habitats
- b. Collect bait by digging for marine worms, clams, and mussels.
- c. Examine different types of fishing gear and practice casting.
- d. Understand rules and regulations pertaining to saltwater species.
- e. Attend a lecture describing recreational fishing effort, its impact on marine species and its economic importance to the State of Maine.

Field Experience

Participants will experience recreational fishing off from Burnt Island. Mackerel, flounder, and Pollack will be the targeted species off the dock, while Striped Bass fishing will take place off from the island's rocky peninsulas.

Maine's Marine Resources

Maine's commercial fisheries once constituted the greatest source of livelihood for the residents of our state. Unfortunately, most of Maine's fish stocks are on the edge of collapse due to human intervention and environmental conditions. At the Maine State Aquarium, participants will examine a multitude of finfish and invertebrates that are harvested from Maine's inshore and offshore waters, as well as learn about the factors that have contributed to their demise.

Objectives

- a. Observe anatomical features, adaptations, and behaviors of marine life
- b. Identify commercially harvested fish and invertebrates exhibited at the Aquarium.
- c. View a Power Point presentation of the following fishing industries: herring, sea cucumber, sea urchin, and aquaculturally grown mussels, oysters, and salmon.
- d. Review commercial catch statistics over the past 50 years and graph the results.
- e. Learn about the methods and tools of fishing by examining diagrams and models
- f. Participate in the activity called "Grandma's Catch" to stimulate discussion.
- g. Discuss the factors that have led to overfishing, conservation practices, and management of the resources.

Field Trip

Participants will visit the Maine State Aquarium located at the DMR Fisheries Laboratory.

Evening Assignment

Read - *The Lobster At Home*, Scribner's Monthly Magazine, 1881

Read - *Guide To Lobstering In Maine*, by DMR staff

Day 3

Lobster Fishery

Ever since early settlers first learned from the Indians how to utilize the lobster, it has been Maine's most prized crustacean. Information about the well-documented lobster fishery can easily be integrated into multiple classroom disciplines. Interesting topics of study include: the biology, anatomy, and behavior of the lobster; the economics and management of the industry; and the culture and folklore surrounding lobsters and lobstermen. Participants will receive extensive information about the lobster fishery including the opportunity to meet a lobster biologist and a lobsterman.

Objectives

- a. Understand the history of lobstering through photographs and historic accounts
- b. Learn about lobster gear and modifications of vessels, traps, and tools.
- c. Observe anatomy and behaviors of a lobster.
- d. Meet lobster scientist Carl Wilson for a lecture and discussion of fishery status, catch vs effort, conservation and management practices, shell disease, and whale entanglement.
- e. Visit a lobster dealer and a lobster pound.

Field Experience

Participants will become lobstermen after boarding the "Hunky Dory." The unique hands-on experience will be extremely memorable as teachers participate in the process of hauling and baiting traps, measuring and banding lobsters, and listening to the tall tales of Dan-Dan the Lobsterman.

Shrimp Fishery

Northern shrimp, *Pandalus borealis*, support a small but important fishery in the Gulf of Maine. They provide a unique fishery management story due to unusual life history characteristics and a management planning process that involves the Atlantic States Marine Fisheries Commission. A DMR shrimp scientist will report on the agency's participation in the annual sampling programs and the use of the collected data for stock assessment and management actions.

Objectives

- a. Observe the anatomical features of Northern shrimp and learn how to sex the species.
- b. Understand behaviors of shrimp including vertical and inshore-offshore migrations.
- c. Examine the gear used to harvest shrimp and understand the function of the by-catch excluder device called the Nordmore grate.
- d. Listen to a scientist describe the status of the stock and share his concerns in maintaining it as a sustainable fishery.

Evening Assignment

Read - *Inshore Groundfish Trawl Survey – Procedures and Protocols*

Read - *The Prehistoric Oyster Shell Heaps of the Damariscotta River*

Day 4

Trawling Aboard a Research Vessel

Participants will board the Darling Marine Center's 42 foot vessel the *Ira C* for a trawl survey. DMR scientist Sally Sherman will join the expedition and lead a scientific survey of the catch. She will explain about the inshore trawl survey work that she has been conducting over the past 8 years.

Objectives

- a. Participate in an inshore trawl survey to obtain multiple benthic species.
- b. Count, measure, and record catch to determine abundance and distribution.
- c. Understand how collected data provides information to management officials.
- d. Collect and observe plankton and bottom sediment samples.

Visiting a Sea Farm and Oyster Midden

The Damariscotta River has a long history of supporting American oysters. A tour of the Mook Sea Farm will reveal how these mollusks are aquaculturally grown by visiting the hatchery where they are spawned and the lease site where they are raised to market-size. Participants will then travel upriver to the Whaleback Mound, one of the largest remaining oyster middens in the world. Archeologist Deb Wilson will share her knowledge about the Native Americans who occupied the area thousands of years ago.

Objectives.

- a. Understand the methods to spawn and raise oysters in an aquaculture setting.
- b. Learn about mussel aquaculture and its successes at grow-out sites on the river.
- c. Observe the layers of oyster shells at the Whaleback Mound.
- d. Listen to Archeologist Deb Wilson speak about the history of this incredible site.

Evening Assignment - Review the week's events and list ways to incorporate fisheries into the classroom curriculum.

Day 5

Shellfish Industries

Fresh clams, clam chowder, canned clams, and clam broth have made the clam justly famous beyond the limits of Maine's coastal waters. Over the years, the soft-shell clam or "steamer," and several other species of mollusks, have contributed to the state's economy. Participants will learn about the dangers that some commercially-harvested species pose to consumers and how the DMR goes about monitoring for toxins and pollution. After a tour of the laboratory, teachers will join local diggers in the mudflat.

Objectives

- a. Compare anatomical features of shellfish clams, oysters, mussels and scallops.
- b. Study and interpret historical shellfish landings data over the past 50 years.
- c. Meet with Amy Fitzpatrick, Public Health Division Director and tour the lab.
- d. Learn about Paralytic Shellfish Poisoning by observing the testing procedures.
- e. Learn about water quality monitoring by touring the laboratory and viewing the procedures associated with detecting fecal coliform bacteria.

Field Experience

Participants will put on their rubber boots, grab a clam hoe and hod and take to the mudflats with commercial diggers. They will work side-by-side learning the trade and listening to the stories told by true clammers. This experience will give them a better understanding of the mudflat's inhabitants and the reasons why people become harvesters.

Sea Urchin Industry

Over the past couple of decades, the green sea urchin fishery contributed millions of dollars to Maine's economy. It developed rapidly in the 1980's as a result of expanding export markets and reached its peak in 1994-95. Along with economic impacts, the fishery has caused major ecological changes to subtidal regions of our coast. Participants will meet with a DMR scientist to learn about the state's role in monitoring and managing the existing resource.

Objectives

- a. Examine the external and internal anatomical features of the sea urchin.
- b. Learn about the harvesting techniques and the rise and fall of the fishery.
- c. Listen to the scientist Robert Russell explain the surveys and monitoring programs used for gathering data for management purposes.

Week in Review

1. Post-test using the *eInstruction* Classroom Performance System.
2. Evaluation of Course
3. Assignment criteria for final project

Pack Up and Move Back to the Mainland

